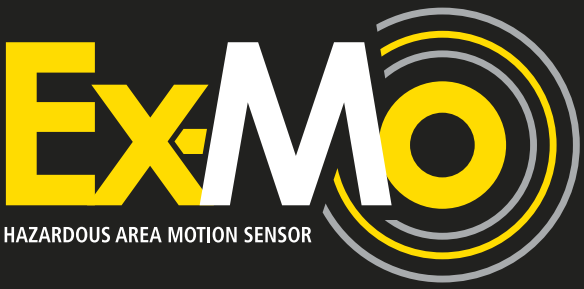

Installation and User Manual

TAKE CONTROL

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Features:

- ATEX/IECEx Zone 1 and Zone 21 certified for use in explosive gas and dust areas
- Multiple sensor / multiple light configurations are possible
- Microwave Doppler technology
- Ambient light level sensor
- Adjustable switch on time
- Adjustable sensitivity and detection range
- Optional ATEX Remote control programmer
- 110 / 230Vac operation or 24Vdc operation
- 10A direct relay output
- 2nd 10A relay output for movement detection
- Control input 12/24Vdc to override the detection sensor

For Warranty and Terms & Conditions please refer to: www.Ex-Mo.co.uk.

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Applications

This unit can provide energy saving by automatically switching off lights in areas that are unoccupied.

- Movement detection in remote working areas, remote sites.
- Control lighting in infrequently used spaces.
- Alerting control centre; Detecting: people / vehicles / other moving objects.

Operation

Sensing movement by microwave, the Ex-Mo will switch on the lights for a period of time while the area is occupied. Additionally the unit can transmit a signal to an alarm system as an intruder alert. Roof or wall mounted with the optional adjustable bracket, several Ex-Mo units can be paralleled to obtain a large area of coverage controlling the same lighting circuit. Alternatively several lights can be controlled from one sensor up to the maximum 10A current. Ex-Mo can operate a higher rated external contactor if required, or supply a signal to an energy management system.

Adjustable on-time from 5 minutes to 60 minutes and adjustable range sensitivity. Operating with a range of 15 to 20 metres.

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Coverage

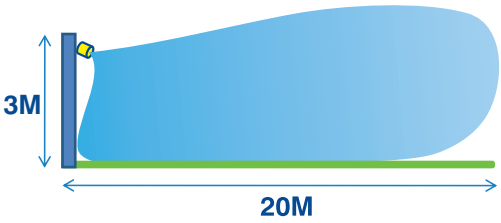
Ex-Mo has a coverage pattern of ~72° horizontally and ~36° vertically. This represents the angular coverage where 70% of Ex-Mo's sensitivity is maintained. In practice Ex-Mo will detect 90° so that a single Ex-Mo placed in the corner of a rectangular room will give complete coverage along the walls.

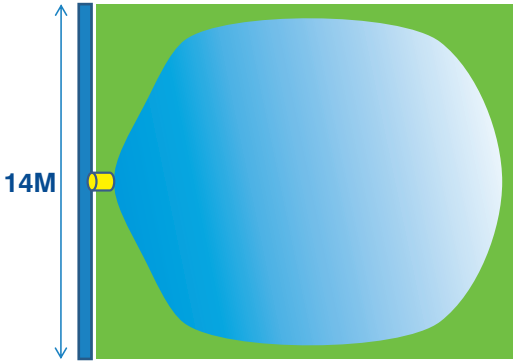
Mounting

Ex-Mo must be securely mounted to a fixed object. Any movement of the sensor could activate the unit as if it were detecting a moving target.

Mount the Ex-Mo on a wall facing the direction of the area to be monitored. Using the adjustable bracket, angle the face of the Ex-Mo toward the target area.

The high frequency radar operates best when a target is approaching or moving away from it. The Microwave Beam is emitted from the front face and is directional. See diagram below.





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Connections

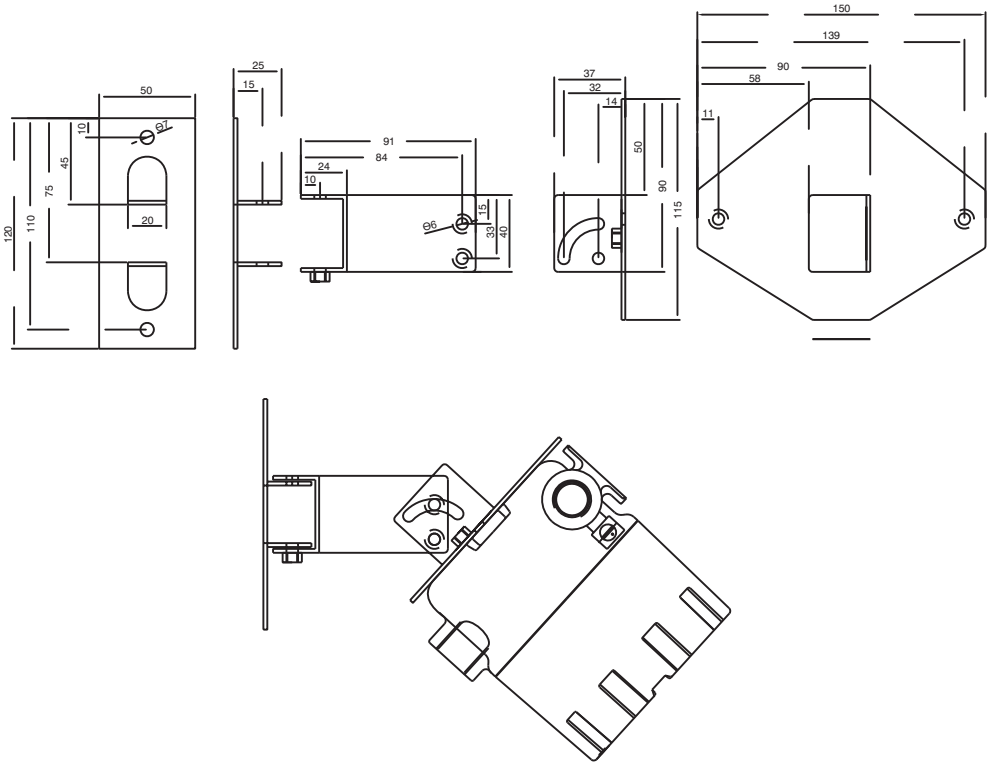
ATEX / IECEx approved cable glands, entry blanking plugs and correctly sized cable are mandatory for the use of this equipment in hazardous areas. All these products are available on request.

Power supply

The standard Ex-Mo is powered by mains 230Vac or alternatively we can offer 110Vac or 24Vdc as a factory supplied option. This information is usually supplied when ordering the Ex-Mo.

Ex-Mo Mounting Bracket

Manufactured from 3mm stainless steel. M6 clinch nuts throughout.



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Relay outputs

Two output relays are provided. The relay outputs are capable of 10A continuous load each. Breaking capacity 2500VA.

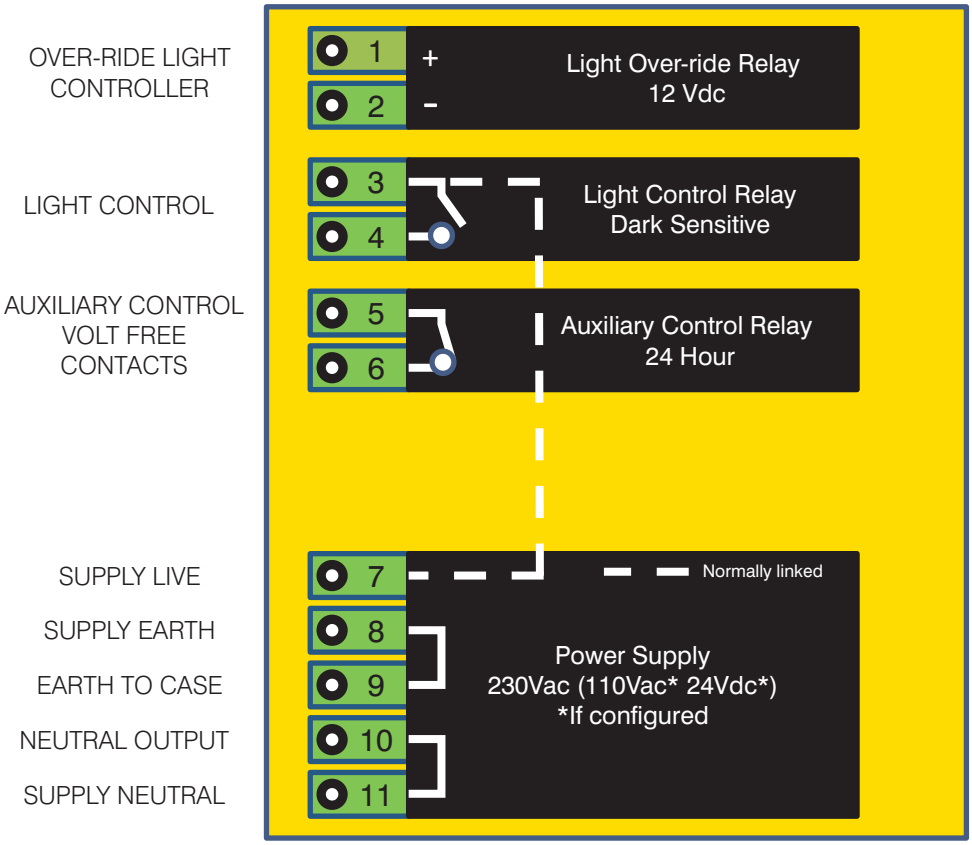
- 'Relay 1' operates to switch on lighting when movement is detected and it is sufficiently dark.
- 'Relay 2' operates independently of the photo electric cell when movement is detected (e.g. for security signalling).

Both relays can be configured as normally open (NO) or normally closed (NC). The factory setting for Relay 2 is normally closed (NC), the contacts will open on motion detection or power failure.

Both relay outputs are isolated (1000Vrms) and can be used as 'volt free' contacts with an external supply not exceeding 250Vac. Useful as a signal for example into a lighting control system or to feed a larger contactor.

Alternatively Relay 1 can power lighting directly from the internal mains supply.

Connection diagram - Typical 230 VAC connection



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Installation - Setup

Ex-Mo's parameters can be set using the internal switches or via the remote controller, follow the relevant section below.

The equipment must be installed by skilled electricians or instructed personnel in accordance with National Legislation and relevant technical standards.

Please read this handbook carefully before commencing installation of Ex-Mo and retain for future reference.

Remove Ex-Mo and any accessories carefully from its packaging.

Ex-Mo can be mounted in two orientations dependent on your preferred cabling route. The optional Ex-Mo mounting bracket must be appropriately positioned facing the target area as described in the coverage and mounting section of this manual.

Ex-Mo can now be attached in either orientation to the fixed mounting bracket and positioned toward the target area. Once the required position has been established all adjustment points should now be fully tightened.

Ensure that Ex-Mo is earthed and note that the unit is not internally fused.

After loosening the retaining locking screw on the lid turn the lid anti-clockwise to remove from the main body. For termination within the Ex-Mo unit please remove the top circuit board by gently extending the two fixing prongs outwards. The green terminal block on the lower circuit board can now be unplugged to aid termination.

On completion of Ex-Mo internal termination ensure that the top circuit board is re-fitted in the correct orientation i.e. with the Ex-Mo label the correct way up.

The Ex-Mo lid can now be re-fitted ensuring that the lid is tight enough to maintain the IP rating, remembering to tighten down the retaining locking screw.

Ex-Mo can now be installed within the recognised code of practise e.g. EN60 079

If Ex-Mo is to be set manually please refer to the Local Adjustment section of this handbook.

Installation - Setup via Remote Controller

The remote controller can be operated in the hazardous area with the lid to the unit fitted and sealed. The remote control is directed towards the glass front and should have a range of up to 10 metres. The Red LED quick flash indicates that the remote control signal was acknowledged.

- For remote operation, check visually that switch 4 of the switch block on the uppermost PCB is set to 'on'.

Setting the Light Sensitivity- Method 1 (Pre-set Light Levels)

- Press 'Walk Test'
- Set the light sensitivity level with the arrow keys. Refer to page 8 of the user manual for desired setting (Level 1-5)
- The level set is indicated by the amount of times the red and yellow LED flash together. For example; two flashes indicates that the Ex-Mo is set to level 2. Please see light Level Indicator Chart for further options.
- You can only go up and down through the levels one at a time. For example, you cannot go from level 1 straight to level 5.
- Set the time delay that you require. You can choose to have 5 minutes, 30 minutes or a one hour time delay. This is the amount of time that the lights will stay on after the last movement within the vicinity of the Ex-Mo
- Press 'Auto Mode,' to confirm the changes that you have made.

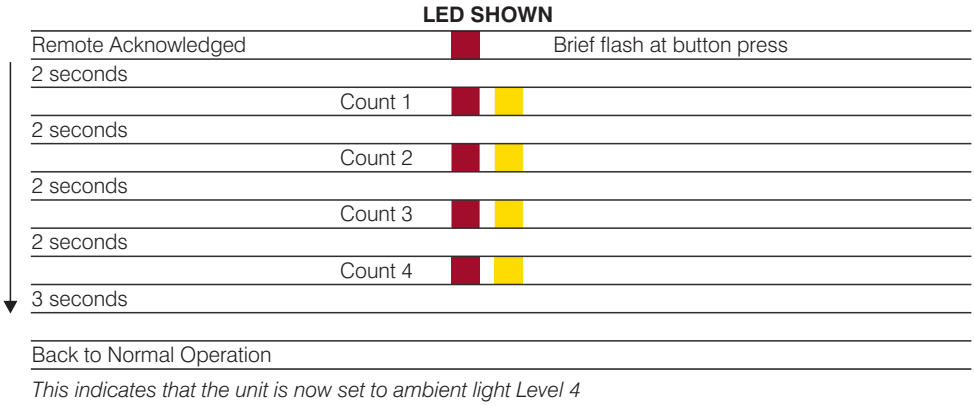
Setting the Light Sensitivity- Method 2 (Current Ambient Light)

- Press 'Walk Test'
- Press 'Light Set Now.' The red LED will then flash on off for 2-4 seconds.
  This indicates that the Ex-Mo has measured the current light ambience.
  This operation will now enable the Ex-Mo to switch the lights on when movement is sensed.
  This now means that if gets lighter than the measured light ambience… The Ex-Mo will switch off the lights.
- Set the time delay that you require. You can choose to have 5 minutes, 30 minutes or a one hour time delay. This is the amount of time that the lights will stay on after the last movement within the vicinity of the Ex-Mo
- Press 'Auto Mode,' to confirm the changes that you have made.

Setting the Movement Sensitivity (Range)

- Make sure that the Ex-Mo is in 'Auto Mode,' (working mode).
- Either set the sensitivity up or down with the sensitivity arrows
- To test the sensitivity, either walk towards or away from the Ex-Mo. When the strobe light goes out you know that you are out of range. This enables the installer to determine whether to decrease or increase the movement sensitivity.

Example: If the unit is on **Level 3 already,** pressing 'Light inc' will show the following sequence.



This indicates that the unit is now set to ambient light Level 4

Notes: *These settings are stored in the memory of the Ex-Mo to be recovered after power off and on.*

LED indicator functions:

RED:
- Indicates the remote control has been pressed, brief flash.
- 1 second on, 1 second off, indicates 'Auto mode' is set and the unit powered and running properly.
- Brief flash on, 1 second off indicates 'Manual mode' is set and the unit powered and running properly
- 3 second on flash, indicates remote control use when the unit is set to local only settings. Remote control is ignored.

YELLOW:
- On, indicates the ambient light is below the threshold level set. Off indicates the ambient light is bright enough to switch the lights off.

WHITE:
- On, indicates that movement has been detected. (Operates only below ambient light levels).

YELLOW and RED:
- Show together in normal operation. Also shown together during 'count' for light level setting with remote control.

YELLOW and RED and WHITE:
- These three can be on briefly during normal operation.
- On continuously: Indicates the 'Override relay' has been energised externally.
- This puts the lighting relay on permanently while energised. (For emergency override use etc.)

Common Light Levels Outdoor**

Common light levels outdoor at day and night can be found in the table below:

Condition	Illumination (ftcd)*	(lux)	Ex-Mo Light Level Set
Sunlight	10,000	107,527	
Full Daylight	1,000	10,752	
Overcast Day (Light cloud)	325	3500	**1**
Overcast Day (Dark cloud)	100	1,075	**2**
Very Dark Day	10	107	**3**
Twilight	1	10.8	**4**
Deep Twilight	0.1	1.08	**5**
Full Moon	0.01	0.108	
Quarter Moon	0.001	0.0108	
Starlight	0.0001	0.0011	
Overcast Night	0.00001	0.0001	

Ex-Mo Range

**foot/candles* ***Data from http://www.engineeringtoolbox.com/light-level-rooms-d_708.html*

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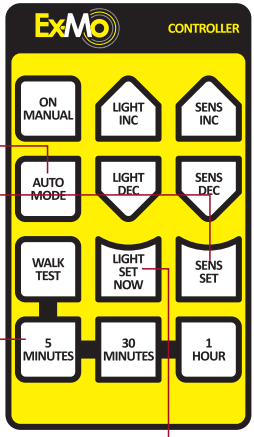
Set up:

1. AUTO MODE
2. Set threshold of movement detection
3. Set length of time lights are desired on since last detected movement
4. Set threshold of light - dark level.



Specification

Supply voltage	110 / 230Volts AC, 50 Hz
Relay 1,2 current maximum	10A 250Vac continuous each (resistive load)
Relay 1,2 Voltage maximum	250Vac
Relay 1,2 Isolation	1000Vrms
Relay 1,2 maximum breaking capacity	2500VA
Override input relay	Factory standard: 12Vdc coil 12mA rated current. 960Ohm coil Must operate voltage 80% of max rated voltage Must release voltage 10% of min rated voltage
Adjustable Time	5-60 minutes (remote control setting) other times available.
Safety	Ⓔx II 2 G D Ex d IIC T6 Ta -40°C to 50°C Gb Ex tb IIIC T85°C Ta -40°C to 50°C Db IP66
Current capability	10A x 2 Open contact relays selectable NC or NO operation
Temperature range	Ambient -40°C to 50°C
Fixing	Flat surface mounting or with optional swivel and tilt bracket
Conformity	ATEX / IECEx / CE
Remote control unit	ATEX IS approved

ATEX / IECEX
Safety Instructions

Distributor and Approvals Details

The Ex-Mo is distributed and maintained solely by:

Ex-Mo JV Limited
2-6 Gawsworth Court
Risley Road
Birchwood
Warrington
Cheshire WA3 6NJ
United Kingdom

Telephone: +44 (0)1925 852745
Fax: +44 (0)1925 820803
Email: sales@Ex-Mo.co.uk

The Ex-Mo system has the following specific approvals:

Name and Type	Ex-Mo: Motion Detection System
ATEX Certificate Number	Baseefa11ATEX0005
IECEx Certificate Number	IECEx BAS 11.0002
Specific Marking of Explosion (GAS)	Ex d IIC T6 Ta -40°C to +50°C Gb
Specific Marking of Explosion (DUST)	Ex tb IIIC T85°C Ta -40°C to +50°C Db IP66
ATEX Directive Marking	Ⓔx II 2 G D
Notified body	CE1180

Instructions for Safety

The equipment must be installed by skilled electricians or instructed personnel in accordance with National Legislation and relevant technical standards.

The equipment must NOT be operated in Zone 0 hazardous area.

The technical data listed on the enclosure label must be observed.

Changes to the design of the equipment are not permitted.

The equipment shall only be operated as intended and only in an undamaged condition.

No parts of the equipment are user-serviceable.

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EC Declaration of Conformity

CE

Signed

A.G. McCormick

Anthony G. McCormick
ATEX Manager
Orange Instruments Limited

Harmonised Standards

EN 60079-0:2009
EN 60079-1:2007

Notified Body

Baseefa 1180
Rockhead Business Park
Staden Lane, Buxton
Derbyshire SK17 9RZ
United Kingdom

Description

The Ex-Mo comprises of an Ex d enclosure, containing an electronic assembly. All field and customer wiring is to the Ex d enclosure and the cover of the Ex d enclosure is only removed for commissioning and periodic adjustment. Detailed instructions on the wiring, first time use and normal operation of the system are described in the accompanying electronics system manual:
Ex-Mo - USER MANUAL ALC-020

Normal Use

The Ex-Mo normally operates within a Hazard Zone 1 / 21. All electrical signals to and from the unit are protected by suitable cables, glands and conduits. In normal use the unit emits a signal and receives a reflection from an object. By this means it can determine whether to switch the relays to control lighting or alarm triggers.

Installation and Calibration

The Ex-Mo must be installed and commissioned by suitably trained personnel. Normally, the unit is mounted and wired to a fixed position on a building; if this is not the case then specific instructions will be provided. The user is required to make electrical connections to their systems according to the wiring instructions in the accompanying manual using suitable cables and connection components. No changes to the equipment or the wiring instructions are permitted. Following connection, and with no hazard present, the unit may be powered up to adjust the sensitivity and other settings. If the electronics are set to “Remote Control” use, the glass cover lid may be fitted and the unit sealed for hazardous operation while still allowing adjustment via the remote control through the window.

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Maintenance

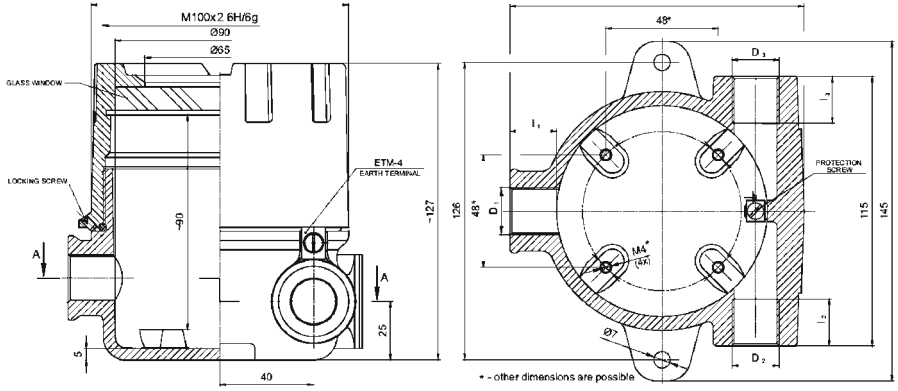
The cover on the Ex d enclosure must not be removed when a hazardous atmosphere is present. The unit must be left for 30 minutes with power off before the cover is removed. With access to the instrument, it is possible to modify the configuration according to the accompanying manual. In the event of suspected damage to the electronic assembly, the circuit boards can be unclipped and removed. The internal chassis plate carrying the instrument can be removed by unscrewing the rear terminal connectors from the power circuit board, removing the circuit board, unscrewing the securing fixings, and removing. The instrument should be packed in antistatic material and sent to the Manufacturer for evaluation. No part of the system is user-serviceable.

Zone of Operation

The Ex-Mo can be used hazardous area Zone 1 where a hazardous atmosphere is likely to occur occasionally. The equipment must not be installed in a Zone 0 area. The enclosure is protected to a liquid ingress rating of IP66 - it is dust-tight and can withstand liquids exposure equivalent to heavy seas, if the Ex d enclosure lid threads are liberally coated with a conductive lubricant.

Physical Description

Overall Size	145 x 132 x 129
Weight	2.5kg (Ex d enclosure), 1.5kg (Aluminium enclosure)
Material	Aluminium in yellow chromating and chemical resistant paint (outside only) or 316L Stainless Steel
Equipment rating	IP66 – Ex d enclosure lid threads liberally coated with conductive lubricant
Earth point	Right hand side M5 internal/external bolt (provided)
Cable entries	In the Ex d enclosure base. Unused entries must be plugged with Ex d certified plugs.



IR900 Infra-red Controller User Handbook

Distributor and Approvals Details

The IR900 is manufactured and maintained solely by:

Ex-Mo JV Limited
2-6 Gawsworth Court
Risley Road
Birchwood
Warrington
Cheshire WA3 6NJ
United Kingdom

Telephone: +44 (0)1925 852745
Fax: +44 (0)1925 820803
Email: sales@Ex-Mo.co.uk

The IR900 has the following specific approvals

Name and Type:	INFRA-RED CONTROLLER TYPE IR900
Certificate Number:	Baseefa 03ATEX0187X
Specific Marking of Explosion Protection:	EEx ia IIC T4 (-20°C ⩽ Ta ⩽ +40°C)
ATEX Directive Marking:	Ex II 1 G
Notified body:	Baseefa (2001) 1180

General Description

The IR900 handheld infra red controller is designed for use with the Ex-Mo motion sensor. It can be used freely within a hazardous area to calibrate and configure this instrument via a window in their flameproof enclosures without having to purge the area of hazardous gases or liquids.

Full details of this interactive use of the IR900 are described in the individual positioner handbooks.

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Zone of Operation
The IR900 is an intrinsically safe device approved for operation in the following environment according to Specific Marking of explosion protection:

EEx ia IIC T4 (-20°C ⩽ Ta ⩽ +40°C) Ta = ambient temperature

IEC CENELEC	*North America*
Zone 0 – continuous hazard present	Division 1
Gas Group – IIC (hydrogen, acetylene, carbon disulphide)	Class 1A (Hydrogen) Class 1B (acetylene)

Surface temperature – T4 135°C – Ambient temperature -20°C to +40°C

Physical Description
Size – 63mm wide, 113mm high, 31mm deep
Weight – 0.25kg
Enclosure – die cast aluminium, nylon coated
Switch membrane – polyester
Equipment rating – IP40

First Time Use
The IR900 is supplied fully tested with a battery pack fitted, ready for immediate use.

Normal Use
The top end of the IR900 (with the projecting IR emitter) should be aimed at the window in the flameproof enclosure housing the equipment to be controlled. Changes in state of indicators behind the window will show correct reception of the IR pulse train from the IR900. The IR900 should be used within 2 metre of the window and it might be necessary to temporarily shade the window under intense ambient light conditions.

Maintenance
The outside of the enclosure can be cleaned using a damp cloth. Do not use solvents.
Do not unscrew the four enclosure retaining screw when a hazard is present. Apart from battery changes there are no user serviceable parts within the IR900. Suspected faulty units must be returned to the Manufacturers.

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Changing the Battery Pack

The battery pack will last for at least 3 years with normal use. Replacement at 2 years is recommended.

The following work MUST be carried out in a SAFE environment with no hazard present.

1) Have the replacement pack to hand.
2) Remove the four posi head screws securing the enclosure back.
3) Remove the enclosure back exposing the battery pack and printed circuit board.
4) Remove the old battery pack and unplug from printed circuit.
5) Plug in new battery pack noting the polarising tab on the circuit board connector.
6) Replace enclosure back and secure with the four screws.
7) Dispose of the old battery pack (manganese) according to local environmental regulations.

Specification

Size:	63mm wide, 113mm high, 31mm deep
Enclosure:	Die cast aluminium, nylon coated
Switch membrane:	Polyester
Enclosure retainers:	4 screws M3 x 10 posi countersunk
Weight:	0.25kg
Equipment rating:	IP40
Quiescent current:	26μA (no key pressed)
Running current:	400μA (key pressed)
Infra red wavelength:	940nm
Radiated Intensity:	15.4mW/sr
Battery Pack terminal voltage:	9V nominal
Battery Pack size:	52mm long x 28mm wide x 19.5mm deep
Battery Pack connection:	Polarised 0.1” 2-way free socket
Battery weight:	0.1kg

EC Declaration of Conformity

CE

Manufacturer

Orange Instruments Limited
Lower Farm Road
Moulton Park
Northampton NN3 6XF
United Kingdom

Notified body

Baseefa
Rockhead Business Park
Staden Lane, Buxton
Derbyshire SK17 9RZ
United Kingdom

Signed

A.G. McCormick

Anthony G. McCormick
ATEX Manager
Orange Instruments Limited

Harmonised Standards
EN 50014 A1 A2: 1997
EN 50020: 2002

Other Standards
EN 50284: 1999

Equipment description
Infra-Red Controller
Type IR900
Ⓔx II 1 G EEx ia IIC T4
(-20°C ⩽ Ta ⩽ +40°C)

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